

Supplementary Data Description

1. Abbreviation Index

EN	Final energy consumption from National Energy Statistics
EP	Final energy consumption from Provincial Energy Statistics
V	Net heating values
C	Net carbon contents
O	Oxidization rates
WRI	Data from World Resource Institute
IPCC	Intergovernmental Panel on Climate Change
NBS	National Bureau of Statistics
CSI	Cement Sustainability Initiative
NDRC tier 1	The National Development and Reform Commission, aggregated emission factors
NDRC tier 2	The National Development and Reform Commission, disaggregated sectors
NDRC tier 3	The National Development and Reform Commission, emission factors disaggregated by fuel types and sectors
NC	The People Republic of China National Communication on Climate Change
NC 1994	1994 National Communication on Climate Change
NC 2005 tier 1	2005 National Communication on Climate Change, aggregated emission factors
NC 2005 tier 2	2005 National Communication on Climate Change, emission factors disaggregated by sectors
NC 2005 tier3	2005 National Communication on Climate Change, emission factors disaggregated by fuel types and sectors
MEIC	Multi-resolution Emission Inventory for China (http://www.meicmodel.org/)
UN average	UN Statistics world average value
UN China	UN Statistics China specific value
IPCC EP	Emission estimated by using provincial energy consumption (EP) and IPCC emission factors of v, c and o
IPCC EN	Emission estimated by using national energy consumption (EN) and IPCC emission factors of v, c and o
NBS EP	Emission estimated by using provincial energy consumption (EP) and NBS emission factors of v, c and o
NBS EN	Emission estimated by using national energy consumption (EN) and NBS emission factors of v, c and o
NDRC tier 1 EP	Emission estimated by using provincial energy consumption (EP) and NDRC tier 1 emission factors of v, c and o
NDRC tier 1 EN	Emission estimated by using national energy consumption (EN) and NDRC tier 1 emission factors of v, c and o
NDRC tier 2 EP	Emission estimated by using provincial energy consumption (EP) and NDRC tier 2 emission factors of v, c and o
NDRC tier 2 EN	Emission estimated by using national energy consumption (EN) and NDRC tier 2 emission factors of v, c and o
NDRC tier 3 EP	Emission estimated by using provincial energy consumption (EP) and NDRC tier 3 emission factors of v, c and o
NDRC tier 3 EN	Emission estimated by using national energy consumption (EN) and NDRC tier 3 emission factors of v, c and o

NC 1994 EN	Emission estimated by using national energy consumption (EN) and NC 1994 emission factors of v, c and o
NC 1994 EP	Emission estimated by using provincial energy consumption (EP) and NC 1994 emission factors of v, c and o
NC 2005 tier 1 EN	Emission estimated by using national energy consumption (EN) and 2005 tier 1 emission factors of v, c and o
NC 2005 tier 1 EP	Emission estimated by using provincial energy consumption (EP) and 2005 tier 1 emission factors of v, c and o
NC 2005 tier 2 EN	Emission estimated by using national energy consumption (EN) and 2005 tier 2 emission factors of v, c and o
NC 2005 tier 2 EP	Emission estimated by using provincial energy consumption (EP) and 2005 tier 2 emission factors of v, c and o
NC 2005 tier 3 EN	Emission estimated by using national energy consumption (EN) and NC 2005 tier 3 emission factors of v, c and o
NC 2005 tier 3 EP	Emission estimated by using provincial energy consumption (EP) and NC 2005 tier 3 emission factors of v, c and o
MEIC EN	Emission estimated by using national energy consumption (EP) and MEIC emission factors of v, c and o
MEIC EP	Emission estimated by using provincial energy consumption (EN) and MEIC emission factors of v, c and o
UN average EN	Emission estimated by using national energy consumption (EP) and UN average emission factors of v, c and o
UN average EP	Emission estimated by using provincial energy consumption (EN) and UN average emission factors of v, c and o
UN China EN	Emission estimated by using national energy consumption (EP) and UN China emission factors of v, c and o
UN China EP	Emission estimated by using provincial energy consumption (EN) and UN China emission factors of v, c and o

2. Supplementary Data (attached with separate file “Supplementary Data.xls”)

1 Activity data

- 1.1 China's national energy consumption 1997-2012
- 1.2 China's provincial energy consumption 1997-2012
- 1.3 China's apparent energy consumption 1950-2013
- 1.4 China's cement and clinker production 1978-2013
- 1.5 China's national coal consumption for 46 sectors 2000-2011
- 1.6 China's national crude oil consumption for 46 sectors 2000-2011
- 1.7 China's national natural gas consumption for 46 sectors 2000-2011

2 Emission factors

- 2.1 UN National specific heating values 1950-2009
 - 2.1.1 UN National specific heating values of domestic raw coal for countries 1950-2009
 - 2.1.2 UN National specific heating values of import raw coal for countries 1950-2009
 - 2.1.3 UN National specific heating values of domestic lignite for countries 1950-2009
 - 2.1.4 UN National specific heating values of import lignite coal for countries 1950-2009
- 2.2 China's emission factors from 6 official sources
 - 2.2.1 Abbreviation Index of emission factor sources
 - 2.2.2 China's heating values v from 6 official sources
 - 2.2.3 China's net carbon content c from 6 official sources
 - 2.2.4 China's percent carbon content C_{ar} from 6 official sources
 - 2.2.5 China's oxidization rate o from 6 official sources
 - 2.2.6 China's final emission factors for fossil fuel combustion from 6 official sources
 - 2.2.7 China's emission factors for cement process
- 2.3 Investigated emission factors
 - 2.3.1 China's percent carbon content C_{ar} and production from 4243 coal mines
 - 2.3.2 China's carbon content c and net heating values v for 602 coal samples
 - 2.3.3 China's 24 coal mine bases and 91 coal mine areas
 - 2.3.4 China's 16 kinds of raw coal and the associated production
 - 2.3.5 China's sectoral specific oxidization rates

3 Emission estimates

- 3.1 Emission inventories based on official emission factors
 - 3.1.0 Summary of 24 Emission inventories based on official emission factors
 - 3.1.1 Fossil fuel emission inventory IPCC EP
 - 3.1.2 Fossil fuel emission inventory IPCC EN
 - 3.1.3 Fossil fuel emission inventory NBS EP
 - 3.1.4 Fossil fuel emission inventory NBS EN
 - 3.1.5 Fossil fuel emission inventory NDRC tier 1 EP
 - 3.1.6 Fossil fuel emission inventory NDRC tier 1 EN
 - 3.1.7 Fossil fuel emission inventory NDRC tier 2 EP
 - 3.1.8 Fossil fuel emission inventory NDRC tier 2 EN
 - 3.1.9 Fossil fuel emission inventory NDRC tier 3 EP
 - 3.1.10 Fossil fuel emission inventory NDRC tier 3 EN
 - 3.1.11 Fossil fuel emission inventory NC 1994 EP
 - 3.1.12 Fossil fuel emission inventory NC 1994 EN
 - 3.1.13 Fossil fuel emission inventory NC 2005 tier 1 EP
 - 3.1.14 Fossil fuel emission inventory NC 2005 tier 1 EN
 - 3.1.15 Fossil fuel emission inventory NC 2005 tier 2 EP
 - 3.1.16 Fossil fuel emission inventory NC 2005 tier 2 EN
 - 3.1.17 Fossil fuel emission inventory NC 2005 tier 3 EP
 - 3.1.18 Fossil fuel emission inventory NC 2005 tier 3 EN

- 3.1.19 Fossil fuel emission inventory MEIC EP
- 3.1.20 Fossil fuel emission inventory MEIC EN
- 3.1.21 Fossil fuel emission inventory UN average EP
- 3.1.22 Fossil fuel emission inventory UN average EN
- 3.1.23 Fossil fuel emission inventory UN China EP
- 3.1.24 Fossil fuel emission inventory UN China EN
- 3.2 Emission of cement production
- 3.3 Emission inventory based on 4243 mine data
- 3.3 Emission inventory based on 602 sample data
- 3.5 Emission results and comparison with international datasets
- 3.6 Uncertainty estimation of this study

3. Supplementary Data Sources

1 Activity data	Data source
1.1 China's national energy consumption 1997-2012	National energy statistics 1998-2013, energy consumption data
1.2 China's provincial energy consumption 1997-2012	Provincial energy statistics 1998-2013, energy consumption data
1.3 China's apparent energy consumption 1950-2013	National energy statistics 1998-2014, energy balance table
1.4 China's cement and clinker production 1978-2013	Cement production: National Statistics Year Book 2014, Clinker production: China Cement Almanac 2005-2014
1.5 China's national coal consumption for 46 sectors 2000-2011	National energy statistics 1998-2013, energy consumption data
1.6 China's national crude oil consumption for 46 sectors 2000-2011	National energy statistics 1998-2013, energy consumption data
1.7 China's national natural gas consumption for 46 sectors 2000-2011	National energy statistics 1998-2013, energy consumption data
2 Emission factors	
2.1 UN National specific heating values 1950-2009	UN Energy Statistics Database
2.1.1 UN National specific heating values of domestic raw coal for countries 1950-2009	UN Energy Statistics Database
2.1.2 UN National specific heating values of import raw coal for countries 1950-2009	UN Energy Statistics Database
2.1.3 UN National specific heating values of domestic lignite for countries 1950-2009	UN Energy Statistics Database
2.1.4 UN National specific heating values of import lignite coal for countries 1950-2009	UN Energy Statistics Database
2.2 China's emission factors from 6 official sources	Source 1: UN Energy Statistics Database, Source 2:IPCC, Source 3:NDRC, Source 4:NBS, Source 5: MEIC, Source 6: NC
2.2.1 Abbreviation Index of emission factor sources	Source 1: UN Energy Statistics Database, Source 2:IPCC, Source 3:NDRC, Source 4:NBS, Source 5: MEIC, Source 6: NC
2.2.2 China's heating values v from 6 official sources	Source 1: UN Energy Statistics Database, Source 2:IPCC, Source 3:NDRC, Source 4:NBS, Source 5: MEIC, Source 6: NC
2.2.3 China's net carbon content c from 6 official sources	Source 1: UN Energy Statistics Database, Source 2:IPCC, Source 3:NDRC, Source 4:NBS, Source 5: MEIC, Source 6: NC
2.2.4 China's percent carbon content Car from 6 official sources	Source 1: UN Energy Statistics Database, Source 2:IPCC, Source 3:NDRC, Source 4:NBS, Source 5: MEIC, Source 6: NC
2.2.5 China's oxidization rate o from 6 official sources	Source 1: UN Energy Statistics Database, Source 2:IPCC, Source 3:NDRC, Source 4:NBS, Source 5: MEIC, Source 6: NC

2.2.6 China's final emission factors for fossil fuel combustion from 6 official sources	Source 1: UN Energy Statistics Database, Source 2:IPCC, Source 3:NDRC, Source 4:NBS, Source 5: MEIC, Source 6: NC
2.2.7 China's emission factors for cement process	NDRC, IPCC 1996,IPCC 2006, CSI
2.3 Investigated emission factors	The emission factors investigated and used in this research
2.3.1 China's percent carbon content Car and production from 4243 coal mines	Investigated by this study
2.3.2 China's carbon content c and net heating values v for 602 coal samples	Investigated by this study
2.3.3 China's 24 coal mine bases and 91 coal mine areas	Investigated by this study
2.3.4 China's 16 kinds of raw coal and the associated production	Investigated by this study, extracted from China Coal Industry Yearbook 1982-2011
2.3.5 China's sectoral specific oxidization rates	The People Republic of China National Communication on Climate Change 2005
3 Emission estimates	
3.1 Emission inventories based on official emission factors	
3.1.0 Summary of 24 Emission inventories based on official emission factors	Energy Statistics Yearbook 1998-2013, IPCC 1996,2006,NBS, NDRC, NC, MEIC, UN
3.1.1 Fossil fuel emission inventory IPCC EP	Energy Statistics Yearbook 1998-2013, IPCC 1996,2006
3.1.2 Fossil fuel emission inventory IPCC EN	Energy Statistics Yearbook 1998-2013, IPCC 1996,2006
3.1.3 Fossil fuel emission inventory NBS EP	Energy Statistics Yearbook 1998-2013, NBS
3.1.4 Fossil fuel emission inventory NBS EN	Energy Statistics Yearbook 1998-2013, NBS
3.1.5 Fossil fuel emission inventory NDRC tier 1 EP	Energy Statistics Yearbook 1998-2013, NDRC 2012
3.1.6 Fossil fuel emission inventory NDRC tier 1 EN	Energy Statistics Yearbook 1998-2013, NDRC 2012
3.1.7 Fossil fuel emission inventory NDRC tier 2 EP	Energy Statistics Yearbook 1998-2013, NDRC 2012
3.1.8 Fossil fuel emission inventory NDRC tier 2 EN	Energy Statistics Yearbook 1998-2013, NDRC 2012
3.1.9 Fossil fuel emission inventory NDRC tier 3 EP	Energy Statistics Yearbook 1998-2013, NDRC 2012
3.1.10 Fossil fuel emission inventory NDRC tier 3 EN	Energy Statistics Yearbook 1998-2013, NDRC 2012
3.1.11 Fossil fuel emission inventory NC 1994 EP	Energy Statistics Yearbook 1998-2013, NC 1994
3.1.12 Fossil fuel emission inventory NC 1994 EN	Energy Statistics Yearbook 1998-2013, NC 1994
3.1.13 Fossil fuel emission inventory NC 2005 tier 1 EP	Energy Statistics Yearbook 1998-2013, NC 2005
3.1.14 Fossil fuel emission inventory NC 2005 tier 1 EN	Energy Statistics Yearbook 1998-2013, NC 2005

3.1.15 Fossil fuel emission inventory NC 2005 tier 2 EP	Energy Statistics Yearbook 1998-2013, NC 2005
3.1.16 Fossil fuel emission inventory NC 2005 tier 2 EN	Energy Statistics Yearbook 1998-2013, NC 2005
3.1.17 Fossil fuel emission inventory NC 2005 tier 3 EP	Energy Statistics Yearbook 1998-2013, NC 2005
3.1.18 Fossil fuel emission inventory NC 2005 tier 3 EN	Energy Statistics Yearbook 1998-2013, NC 2005
3.1.19 Fossil fuel emission inventory MEIC EP	Energy Statistics Yearbook 1998-2013, MEIC 2014
3.1.20 Fossil fuel emission inventory MEIC EN	Energy Statistics Yearbook 1998-2013, MEIC 2014
3.1.21 Fossil fuel emission inventory UN average EP	Energy Statistics Yearbook 1998-2013, UN 2013
3.1.22 Fossil fuel emission inventory UN average EN	Energy Statistics Yearbook 1998-2013, UN 2013
3.1.23 Fossil fuel emission inventory UN China EP	Energy Statistics Yearbook 1998-2013, UN 2013
3.1.24 Fossil fuel emission inventory UN China EN	Energy Statistics Yearbook 1998-2013, UN 2013
3.2 Emission of cement production	Investigated by this study
3.3 Emission inventory based on 4243 mine data	Investigated by this study
3.3 Emission inventory based on 602 sample data	Investigated by this study
3.5 Emission results and comparison with international datasets	BP, Berkeley National Laboratory CDIAC, EDGAR, EIA, IEA, WRI and World Bank

References:

- 1 Fridley, D. Inventory of China's Energy-Related CO₂ Emissions in 2008. *Lawrence Berkeley National Laboratory* (2011).
- 2 Intergovernmental Panel on Climate Change (IPCC). Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. (1997).
- 3 Intergovernmental Panel on Climate Change (IPCC). *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. (Intergovernmental Panel on Climate Change, 2006).
- 4 National Development and Reform Commission (NDRC). *The People's Republic of China National Greenhouse Gas Inventory*. (China Environmental Science Press 2007).
- 5 The United Nations. The United Nations Energy Statistics Database. (2010).
- 6 National Development and Reform Commission (NDRC). Second National Communication on Climate Change of the People's Republic of China. (2012).
- 7 National Bureau of Statistics of China -NBSC. *Chinese Energy Statistics Yearbook*. (China Statistics, 1990-2013).
- 8 Center for Earth System Science at Tsinghua University. Multi-resolution Emission Inventory for China (MEIC),. (2014).
- 9 Fridley, E. D. China Energy Databook -- User Guide and Documentation, Version 7.0. (Lawrence Berkeley National Laboratory, Lawrence Berkeley National Laboratory, 2008).
- 10 Andres, R. J. *et al.* A synthesis of carbon dioxide emissions from fossil-fuel combustion. *Biogeosciences* **9**, 1845-1871 (2012).
- 11 Andres, R. J., Boden, T. A. & Higdon, D. A new evaluation of the uncertainty associated with CDIAC estimates of fossil fuel carbon dioxide emission. *Tellus B* **66** (2014).
- 12 Sinton, J. E. Accuracy and reliability of China's energy statistics. *China Economic Review* **12**, 373-383 (2001).
- 13 Marland, G. Emissions accounting: China's uncertain CO₂ emissions. *Nature Clim. Change* **2**, 645-646 (2012).
- 14 Sinton, J. E. & Fridley, D. G. A guide to China's energy statistics. *Journal of Energy Literature* **8**, 22-35 (2002).
- 15 Liu, J. & Yang, H. China fights against statistical corruption. *Science (New York, NY)* **325**, 675 (2009).
- 16 Holz, C. A. The quality of China's GDP statistics. *China Economic Review* **30**, 309-338 (2014).
- 17 Rawski, T. G. What is happening to China's GDP statistics? *China Economic Review* **12**, 347-354 (2001).
- 18 Tu, J. Industrial organisation of the Chinese coal industry. (Freeman Spogli Institute for International Studies. , 2011).
- 19 State Administration of Coal Mine Safety. *China Coal Industry Yearbook*, 2013).
- 20 BP. Statistical Review of World Energy (2014).
- 21 CSI (Cement Sustainability Initiative). CO₂ and energy accounting and reporting standard for the cement industry, version 3.0. (2011).

- 22 Boden, T. A., G. Marland, and R.J. Andres. Global, Regional, and National Fossil-Fuel CO₂ Emissions., (Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, 2011).
- 23 Olivier, J. G., Janssens-Maenhout, G. & Peters, J. A. *Trends in global CO₂ emissions: 2014 report*. (PBL Netherlands Environmental Assessment Agency, 2014).
- 24 U.S. Energy Information Administration (EIA). (2013).
- 25 EIA. International Energy Statistics. (U.S. Energy Information Administration (EIA), Washington, DC, 2014).
- 26 Global Carbon Project. Carbon Budget 2014. (2014).
- 27 International Energy Agency (IEA). Coal Information 2012. (2013).
- 28 International Energy Agency(IEA). CO₂ Emission from Fuel Combustion. (2013).
- 29 International Energy Agency(IEA). Key World Energy Statistics. (2013).
- 30 Intergovernmental Panel on Climate Change (IPCC). *Revised 1996 IPCC guidelines for national greenhouse gas inventories*. (Intergovernmental Panel on Climate Change, 1997).
- 31 Center for Earth System Science at Tsinghua University. *Multi-resolution Emission Inventory for China (MEIC)*, <<http://www.meicmodel.org/>> (2014).
- 32 National Bureau of Statistics. *China Statistical Yearbook 2013*. (China Statistics Press, 2013).
- 33 National Bureau of Statistics of China. China Statistical Yearbook. (1996-2012).
- 34 National Bureau of Statistics of China -NBSC. *Chinese Energy Statistics Yearbook*. (China Statistics, 1995-2013).
- 35 National Statistical Bureau of China. China Provincial Statistics Yearbook 2008. (National Statistical Bureau of China, Beijing, 2008).
- 36 National Development and Reform Commission (NDRC). (Beijing, 2007).
- 37 National Development and Reform Commission (NDRC). (2010).
- 38 National Development and Reform Commission (NDRC). Guidelines for Provincial Greenhouse Gas Emission Inventories in China. (Beijing, 2012).
- 39 National Development and Reform Commission of China (NDRC). The Outline of the 12th Five-Year Plan for National Economic and Social Development. (2011).
- 40 UNFCCC. *National Communications from Non-Annex I Parties*, <<http://unfccc.int/resource/docs/2005/sbi/eng/18a02.pdf>> (2005).
- 41 UNFCCC. Kyoto Protocol. (2012).
- 42 World Bank. World Development Indicators. (2013).
- 43 World Resource Institute (WRI). CAIT 2.0. 2013. Climate Analysis Indicators Tool: WRI's Climate Data Explorer. Washington, DC: World Resources Institute. (2013).